FIG.1A

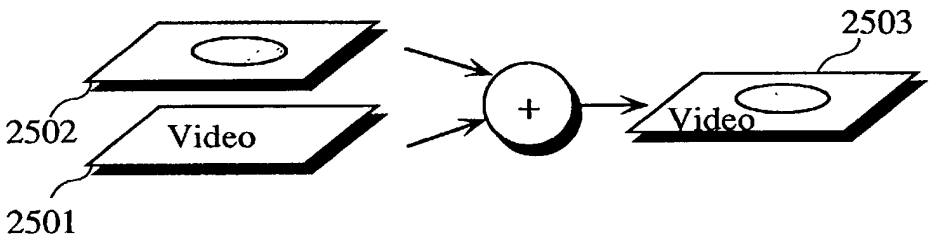


FIG.1B

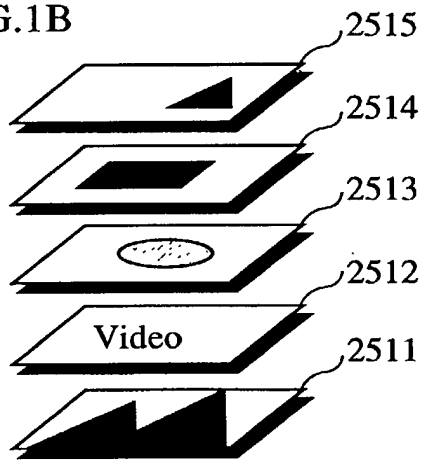


FIG.2

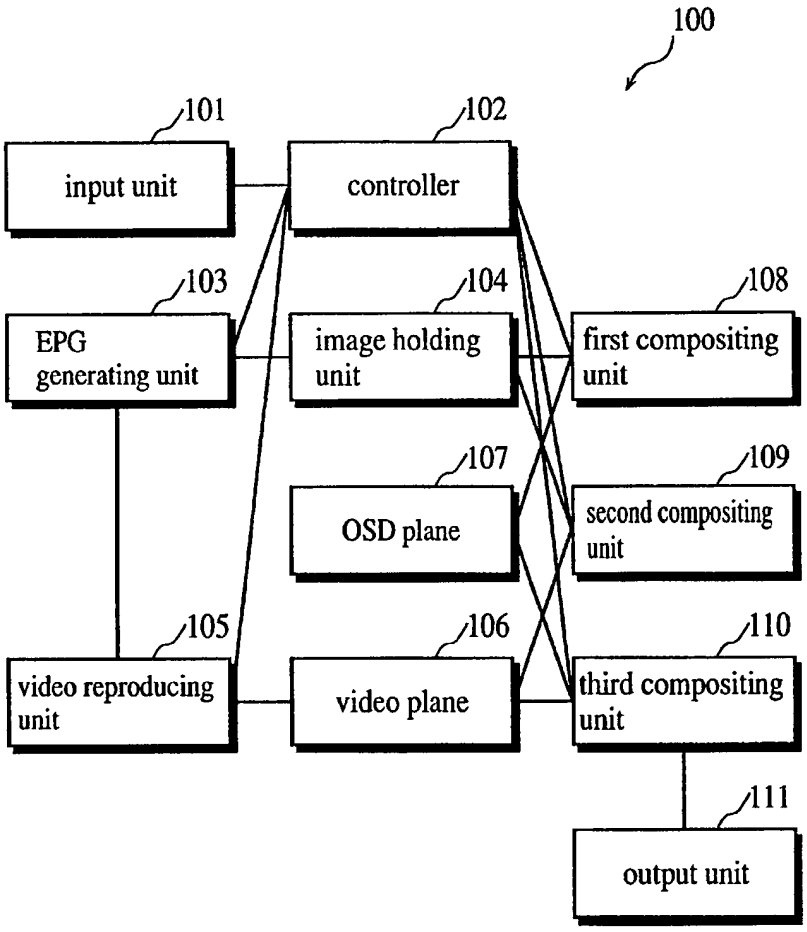

100
101
input unit
102
controller
103
EPG generating unit
104
image holding unit
108
first compositing unit
107
OSD plane
109
second compositing unit
105
video reproducing unit
106
video plane
110
third compositing unit
111
output unit

FIG.3A

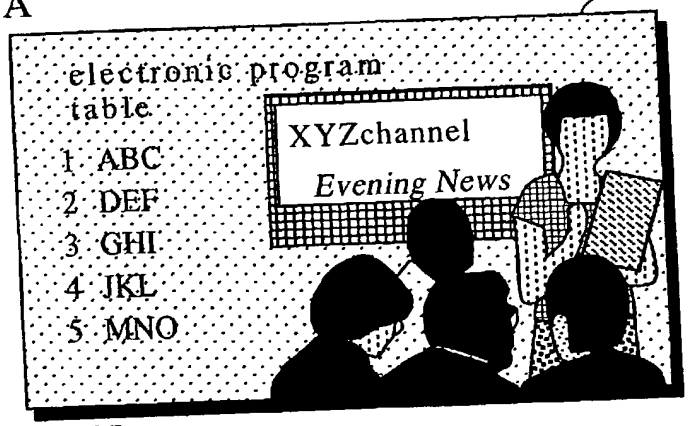
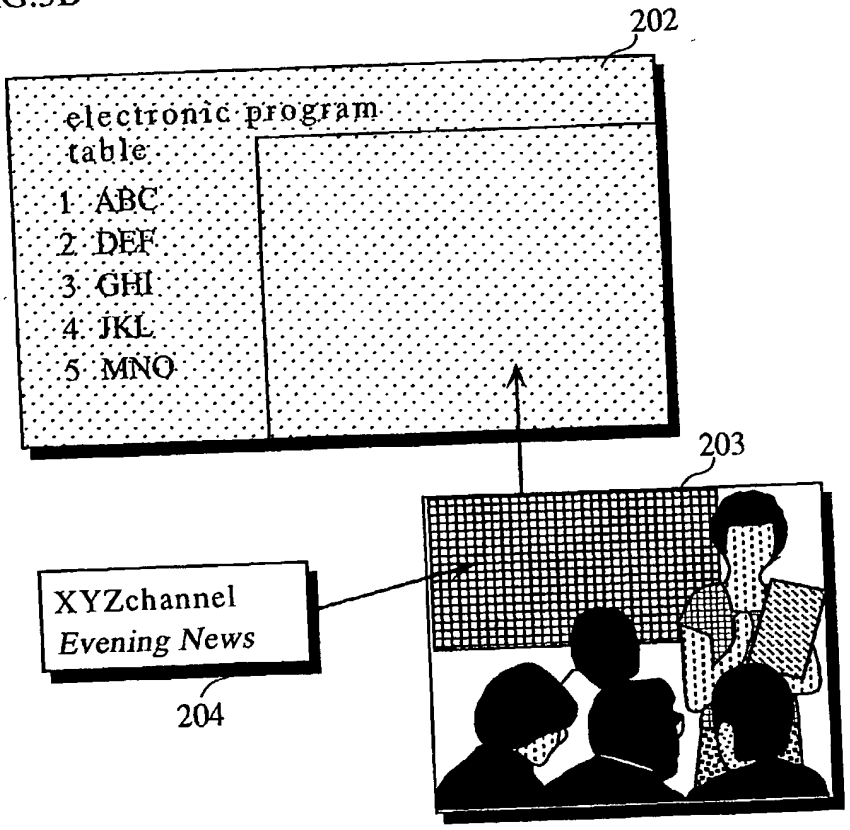

201
electronic program
table
1 ABC
2 DEF
3 GHI
4 JKL
5 MNO
XYZchannel
Evening News

FIG.3B


202
electronic program
table
1 ABC
2 DEF
3 GHI
4 JKL
5 MNO
203
XYZchannel
Evening News
204

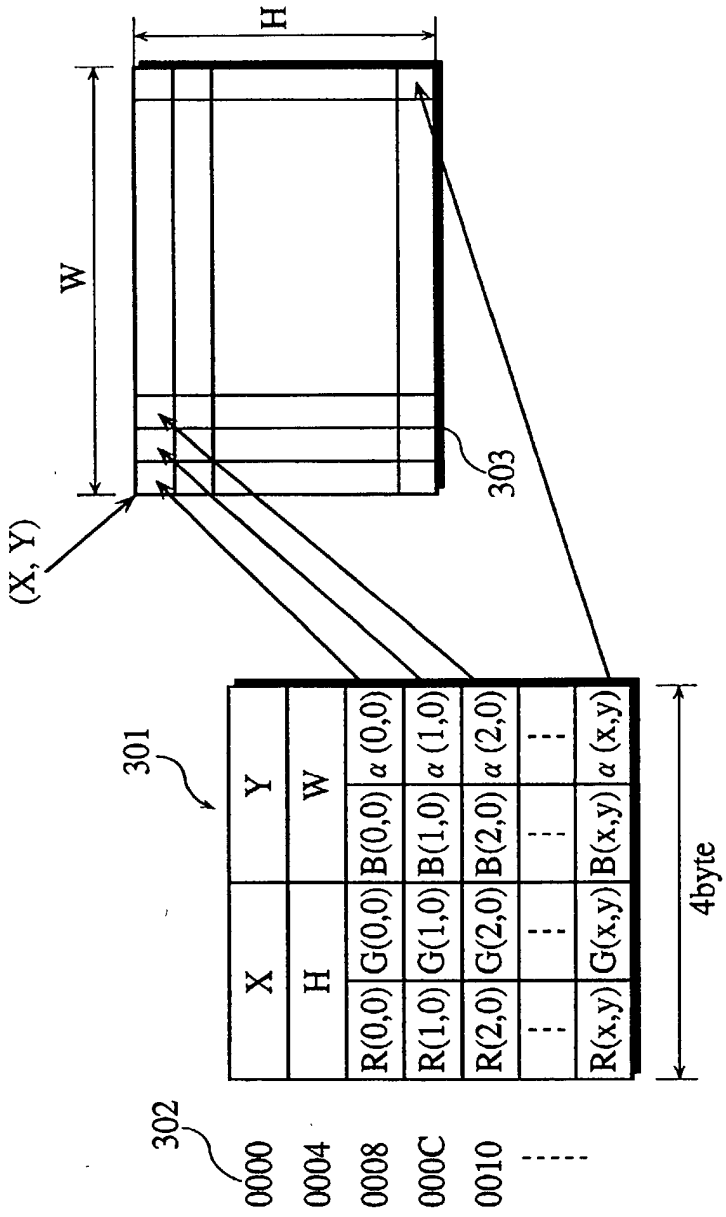

H
W
(X, Y)
303
301
302
X
Y
H
W
R(0,0) G(0,0) B(0,0) α (0,0)
R(1,0) G(1,0) B(1,0) α (1,0)
R(2,0) G(2,0) B(2,0) α (2,0)
R(x,y) G(x,y) B(x,y) α (x,y)
4byte
0000
0004
0008
000C
0010

FIG.4

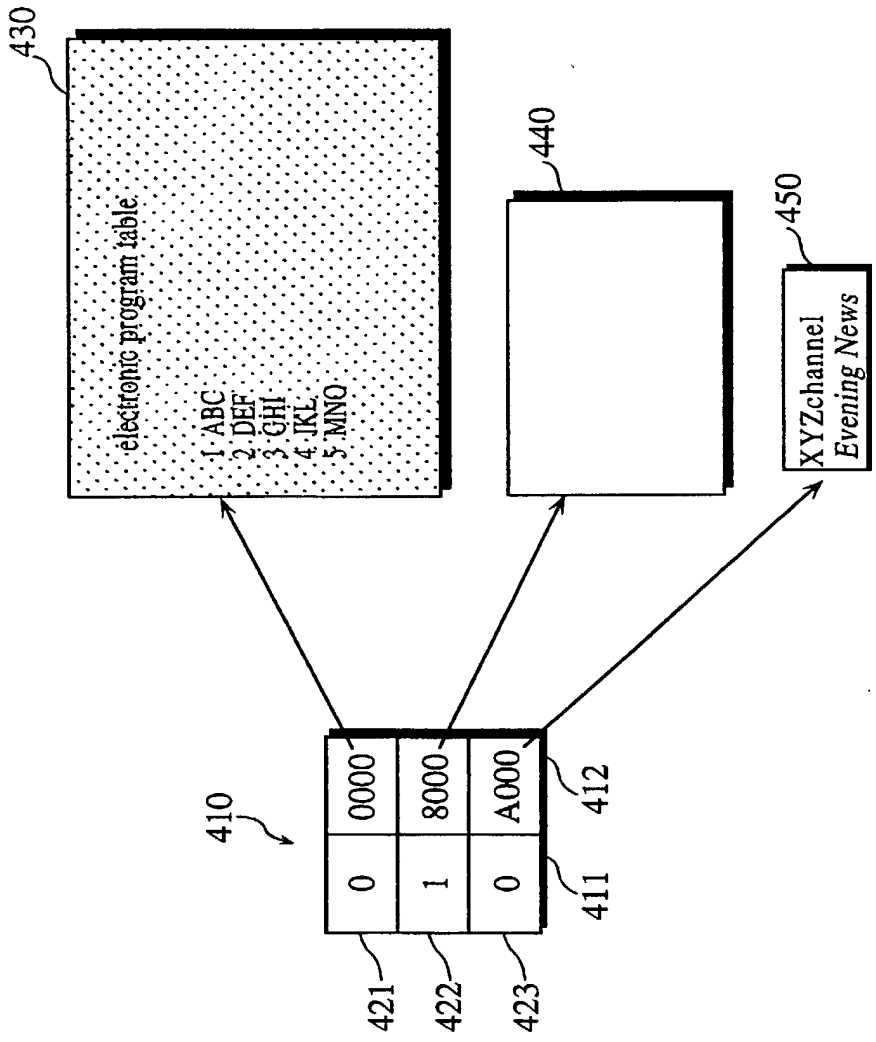

430
electronic program table
1 ABC
2 DEF
3 GHI
4 JKL
5 MNO
440
450
XYZchannel
Evening News
410
0000
8000
A000
412
0
1
0
411
421
422
423

FIG.5

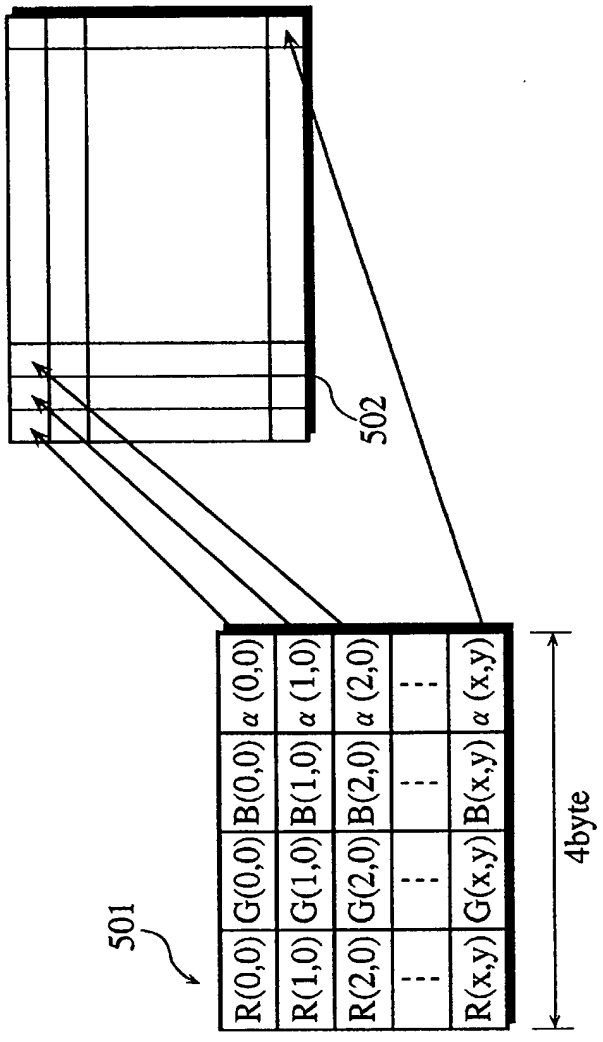
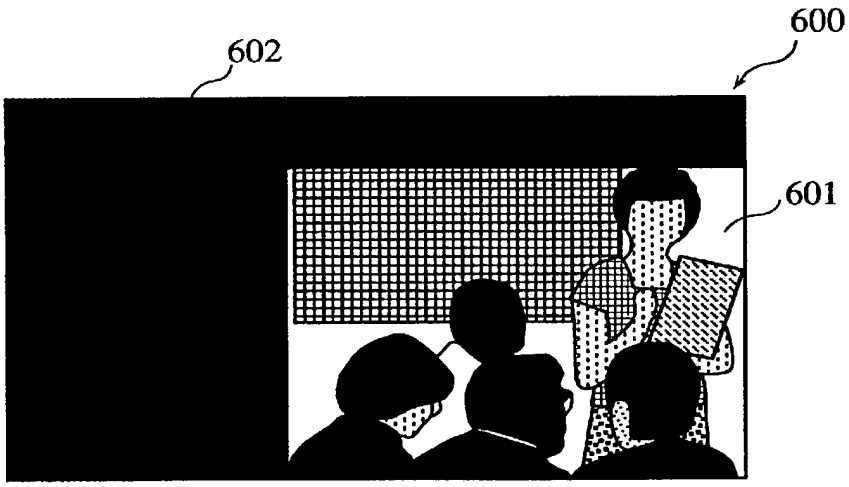

502
501
R(0,0) G(0,0) B(0,0) α (0,0)
R(1,0) G(1,0) B(1,0) α (1,0)
R(2,0) G(2,0) B(2,0) α (2,0)
--- --- --- ---
R(x,y) G(x,y) B(x,y) α (x,y)
4byte

FIG.6

FIG.7



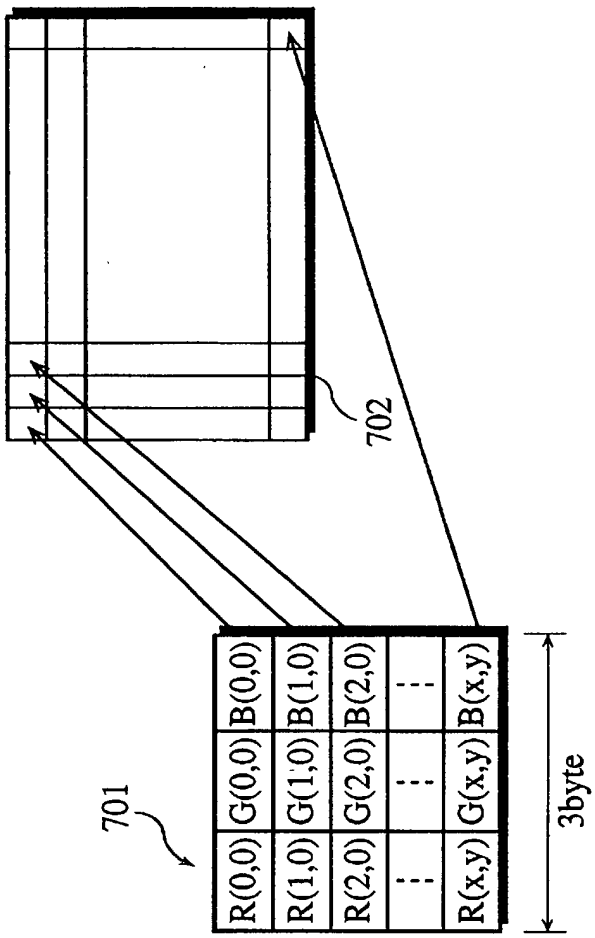


FIG.8

FIG.9

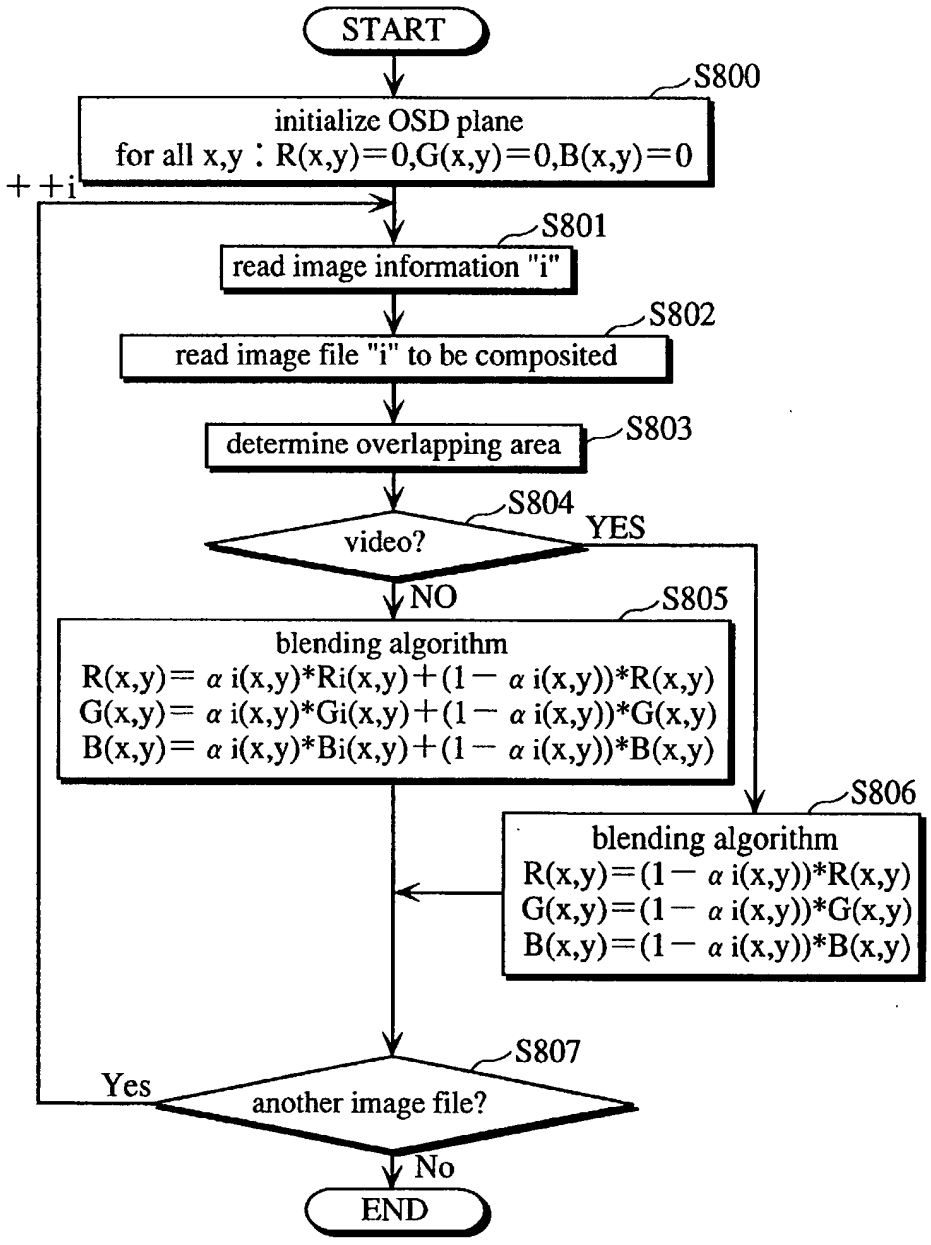

START
S800
initialize OSD plane
for all x,y : R(x,y)=0,G(x,y)=0,B(x,y)=0
++i
S801
read image information "i"
S802
read image file "i" to be composited
S803
determine overlapping area
S804
video?
YES
NO
S805
blending algorithm
R(x,y)= α i(x,y)*Ri(x,y)+(1− α i(x,y))*R(x,y)
G(x,y)= α i(x,y)*Gi(x,y)+(1− α i(x,y))*G(x,y)
B(x,y)= α i(x,y)*Bi(x,y)+(1− α i(x,y))*B(x,y)
S806
blending algorithm
R(x,y)=(1− α i(x,y))*R(x,y)
G(x,y)=(1− α i(x,y))*G(x,y)
B(x,y)=(1− α i(x,y))*B(x,y)
S807
Yes
another image file?
No
END

FIG.10

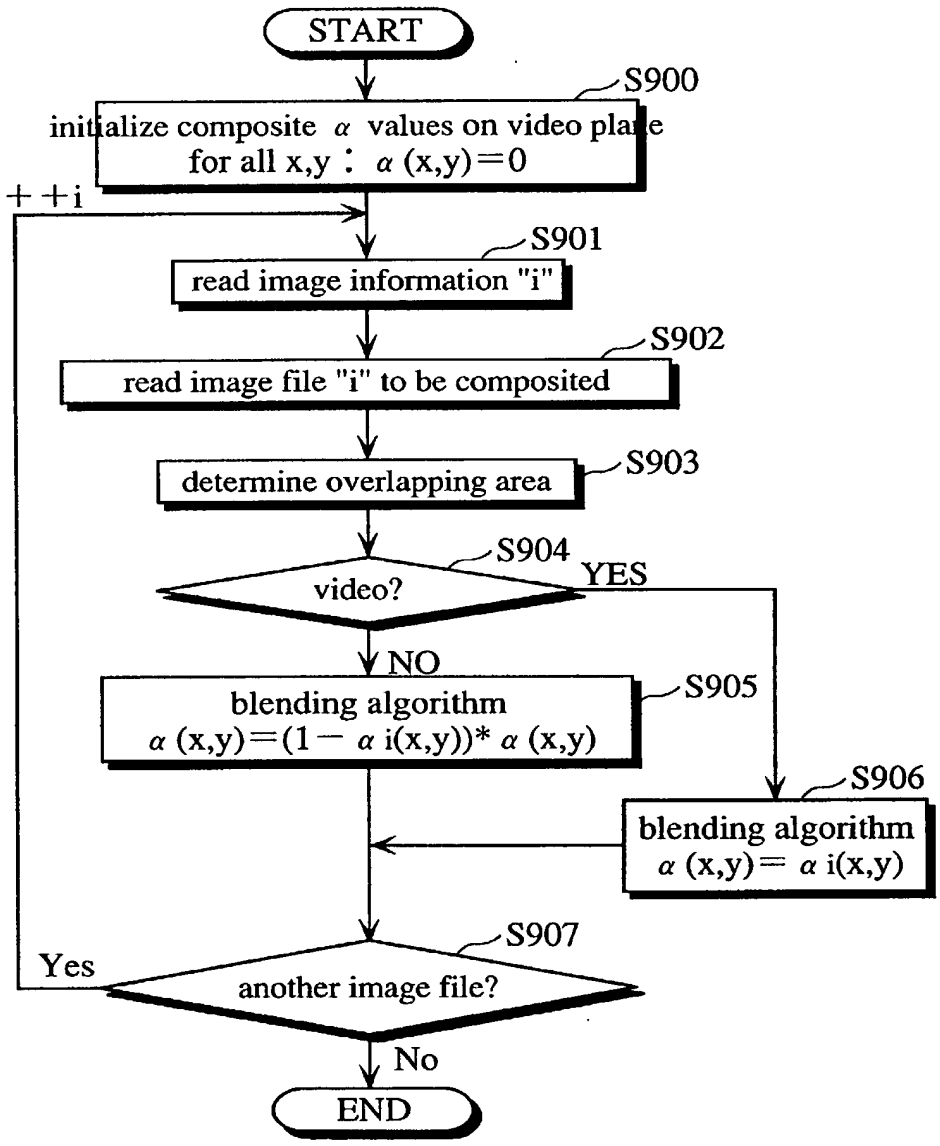

START
S900
initialize composite α values on video plane
for all x,y : α (x,y)=0
++i
S901
read image information "i"
S902
read image file "i" to be composited
S903
determine overlapping area
S904
video?
YES
NO
S905
blending algorithm
α (x,y)=(1− α i(x,y))* α (x,y)
S906
blending algorithm
α (x,y)= α i(x,y)
S907
Yes
another image file?
No
END

FIG.11

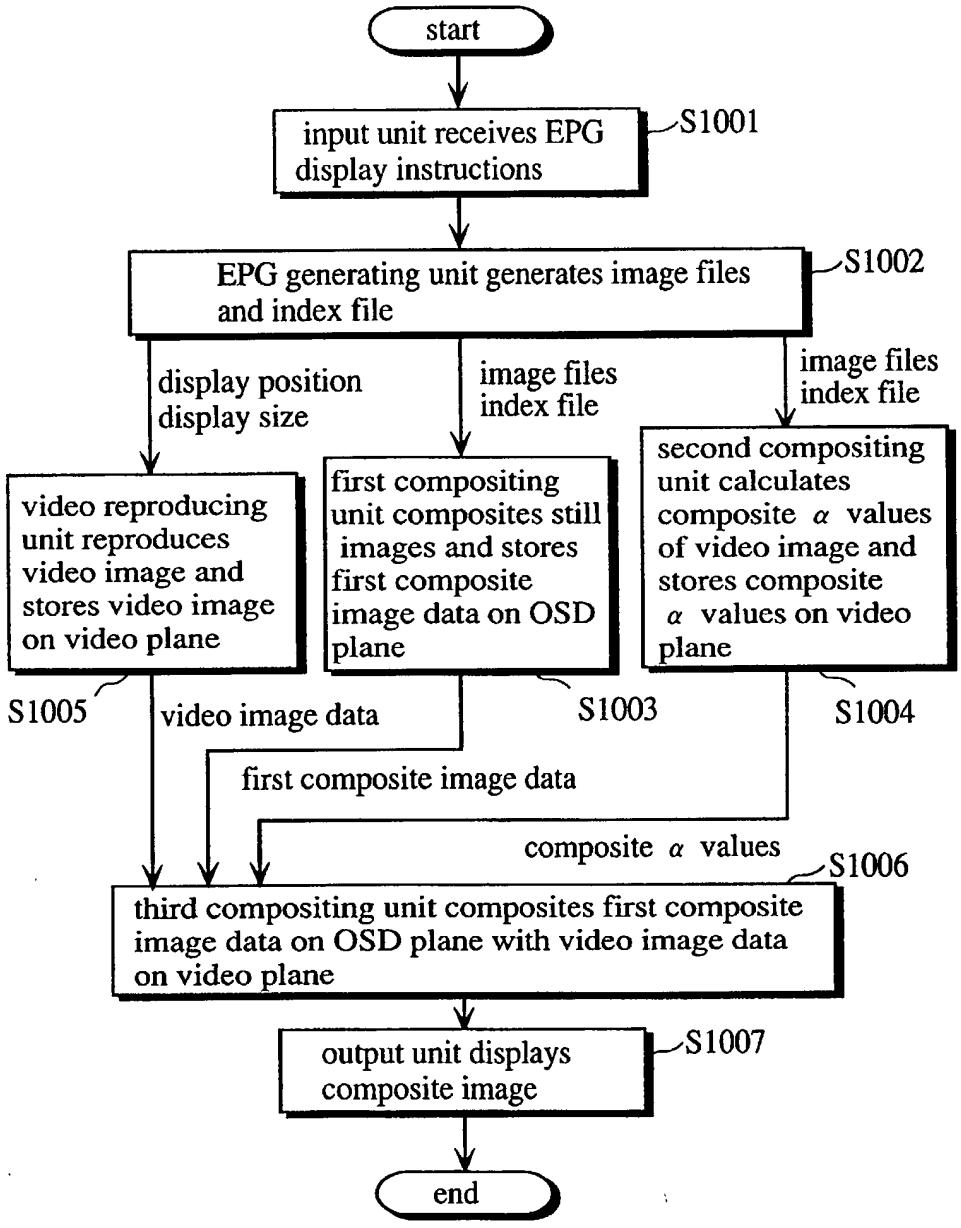

start
input unit receives EPG display instructions
S1001
EPG generating unit generates image files and index file
S1002
display position
display size
image files
index file
image files
index file
video reproducing unit reproduces video image and stores video image on video plane
first compositing unit composites still images and stores first composite image data on OSD plane
second compositing unit calculates composite α values of video image and stores composite α values on video plane
S1005
video image data
S1003
S1004
first composite image data
composite α values
S1006
third compositing unit composites first composite image data on OSD plane with video image data on video plane
output unit displays composite image
S1007
end

FIG.12

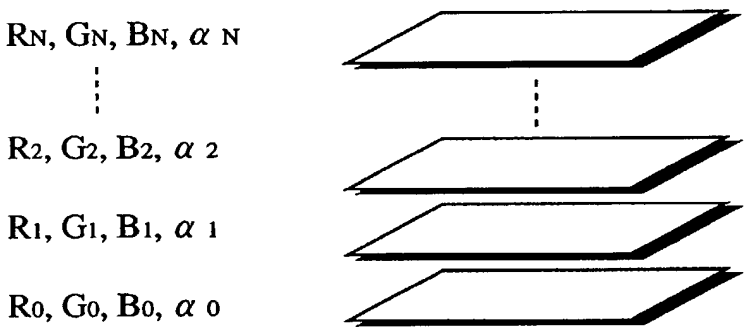


FIG.13

```
1     R=0 ;
2     G=0 ;
3     B=0 ;
4     α =0 ;
5     for (i=0 ; i<=N ; i++) {
6       if (VIDEO=component i) {
7             R=(1− α i)*R ;
8             G=(1− α i)*G ;
9             B=(1− α i)*B ;
10            α = α i ;
11      } else {
12            R= α i*Ri+(1− α i)*R ;
13            G= α i*Gi+(1− α i)*G ;
14            B= α i*Bi+(1− α i)*B ;
15            α = α *(1− α i) ;
16      }
17    }
18    R=R+ α *Rv ;
19    G=G+ α *Gv ;
20    B=B+ α *Bv ;
```

FIG.14

```
[program 1]
1          R=0 ;
2          G=0 ;
3          B=0 ;
4          α=0 ;
5          for (i=0 ; i<=N ; i++) {
6            if (VIDEO=component i) {
7                  R=(1− α i)*R ;
8                  G=(1− α i)*G ;
9                  B=(1− α i)*B ;
10                 α = α i ;
11           } else {
12                 R= α i*Ri+(1− α i)*R ;
13                 G= α i*Gi+(1− α i)*G ;
14                 B= α i*Bi+(1− α i)*B ;
15                 α = α *(1− α i) ;
16           }
17         }
[program 2]
1          while(true) {
2                  R=R+ α *Rv ;
3                  G=G+ α *Gv ;
4                  B=B+ α *Bv ;
5          }
```

FIG.15

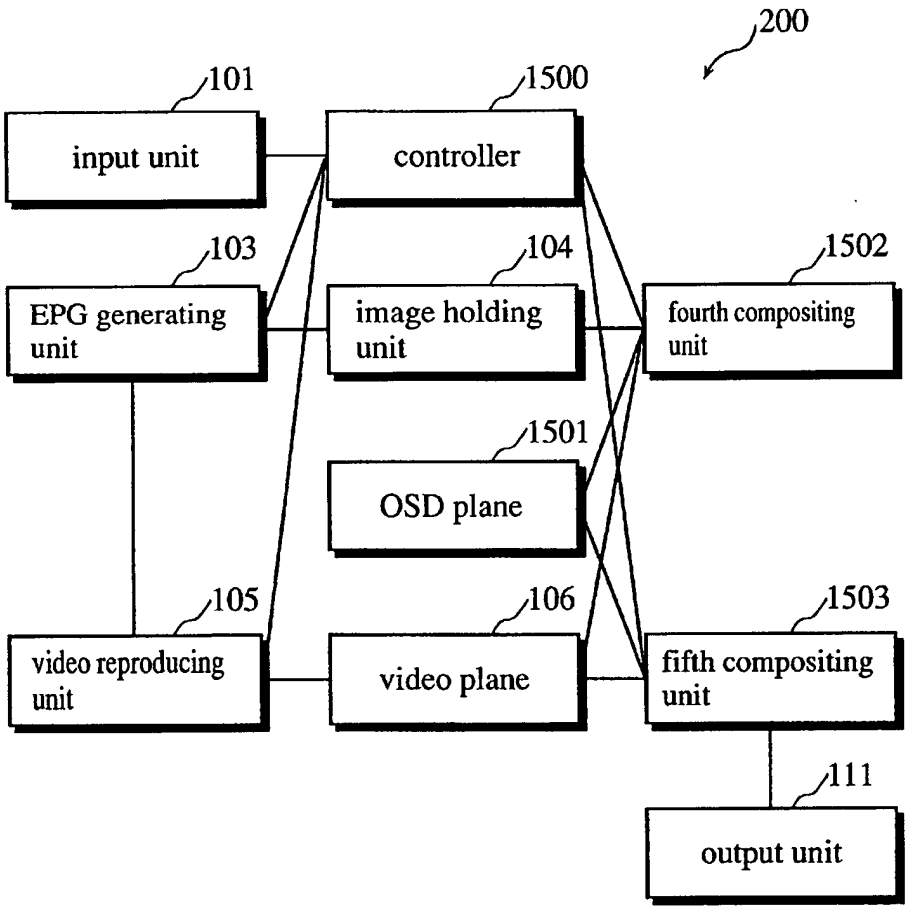

200
101
input unit
1500
controller
103
EPG generating unit
104
image holding unit
1502
fourth compositing unit
1501
OSD plane
105
video reproducing unit
106
video plane
1503
fifth compositing unit
111
output unit

FIG.16

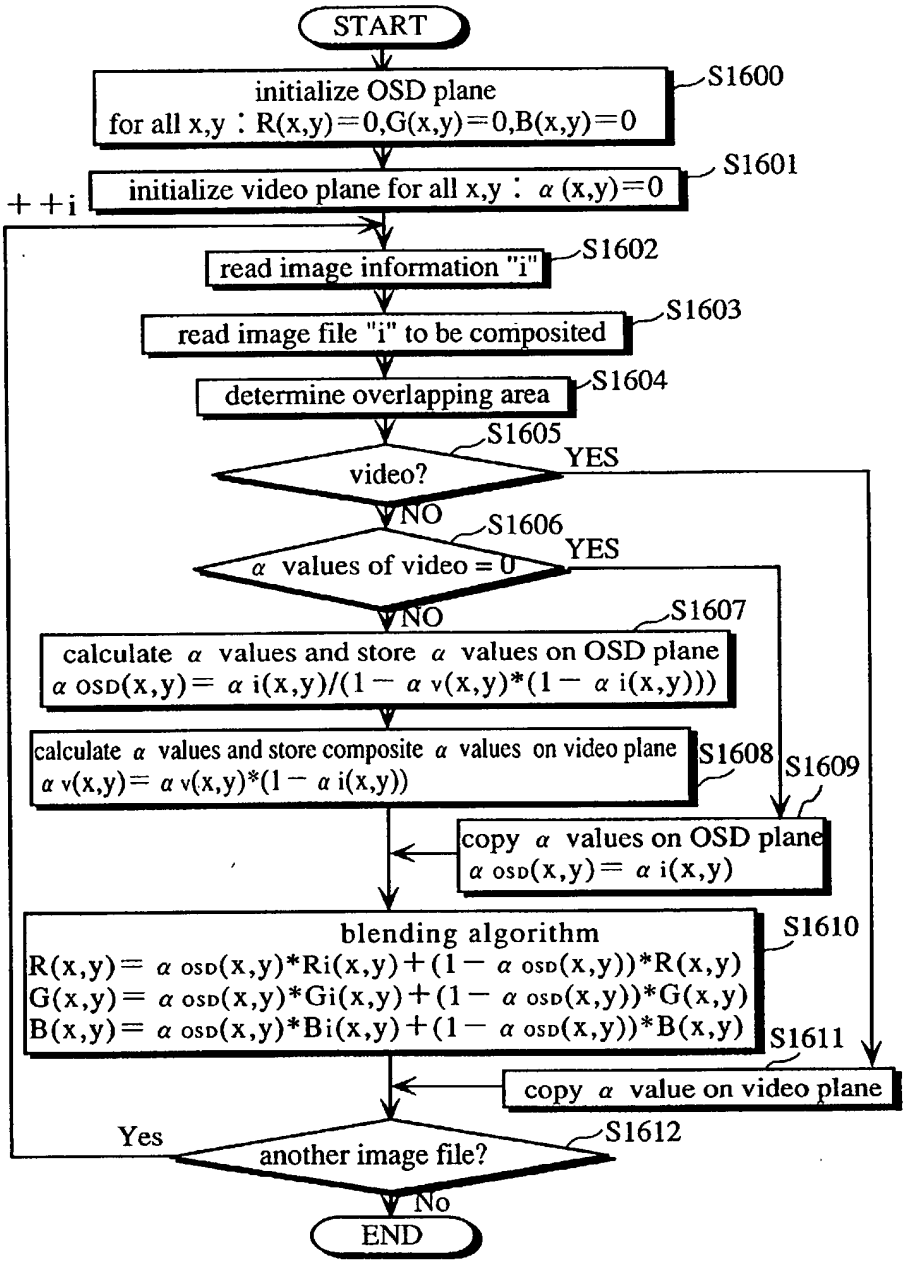

START
initialize OSD plane
for all x,y : R(x,y)=0,G(x,y)=0,B(x,y)=0
S1600
initialize video plane for all x,y : α(x,y)=0
S1601
++i
read image information "i"
S1602
read image file "i" to be composited
S1603
determine overlapping area
S1604
video?
S1605
YES
NO
α values of video = 0
S1606
YES
NO
calculate α values and store α values on OSD plane
α OSD(x,y)= α i(x,y)/(1− α v(x,y)*(1− α i(x,y)))
S1607
calculate α values and store composite α values on video plane
α v(x,y)= α v(x,y)*(1− α i(x,y))
S1608
S1609
copy α values on OSD plane
α OSD(x,y)= α i(x,y)
blending algorithm
R(x,y)= α OSD(x,y)*Ri(x,y)+(1− α OSD(x,y))*R(x,y)
G(x,y)= α OSD(x,y)*Gi(x,y)+(1− α OSD(x,y))*G(x,y)
B(x,y)= α OSD(x,y)*Bi(x,y)+(1− α OSD(x,y))*B(x,y)
S1610
S1611
copy α value on video plane
Yes
another image file?
S1612
No
END

FIG.17

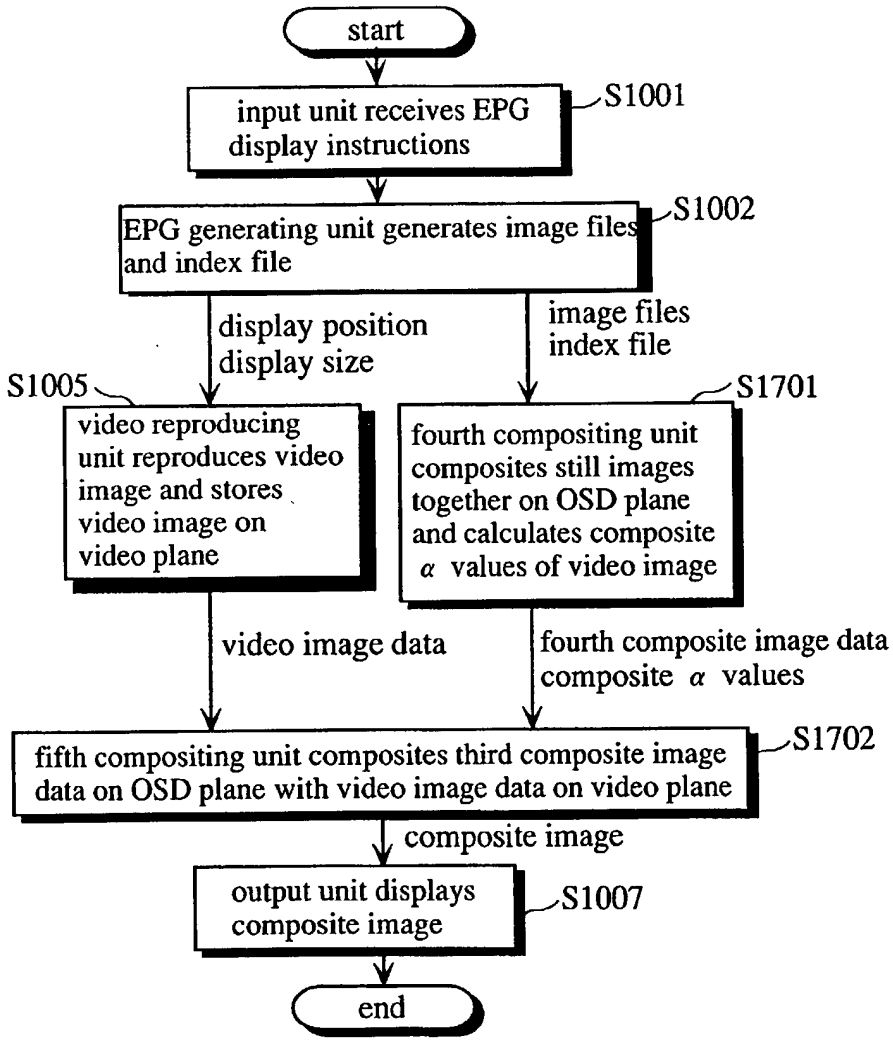

start
input unit receives EPG display instructions
S1001
EPG generating unit generates image files and index file
S1002
display position
display size
image files
index file
S1005
video reproducing unit reproduces video image and stores video image on video plane
S1701
fourth compositing unit composites still images together on OSD plane and calculates composite α values of video image
video image data
fourth composite image data
composite α values
fifth compositing unit composites third composite image data on OSD plane with video image data on video plane
S1702
composite image
output unit displays composite image
S1007
end

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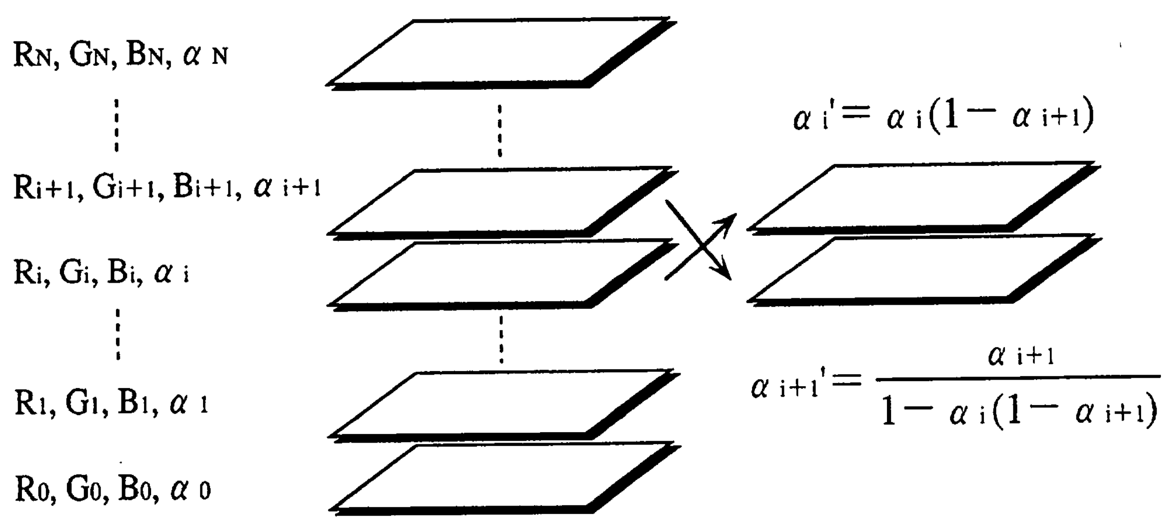
FIG.18



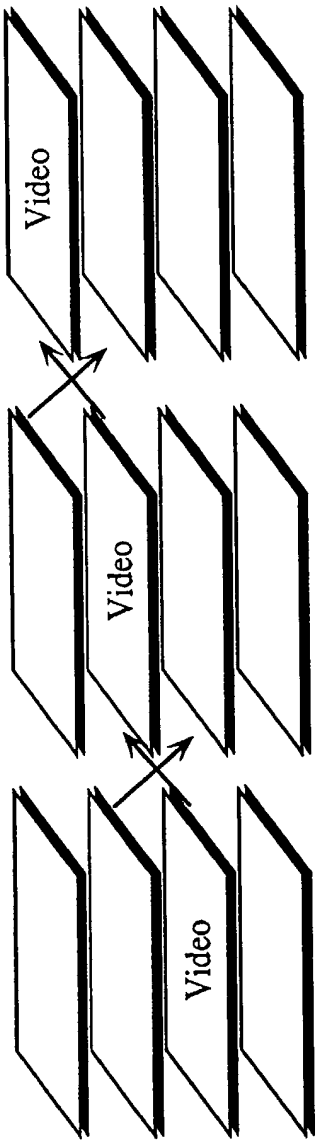


FIG.19

FIG.20

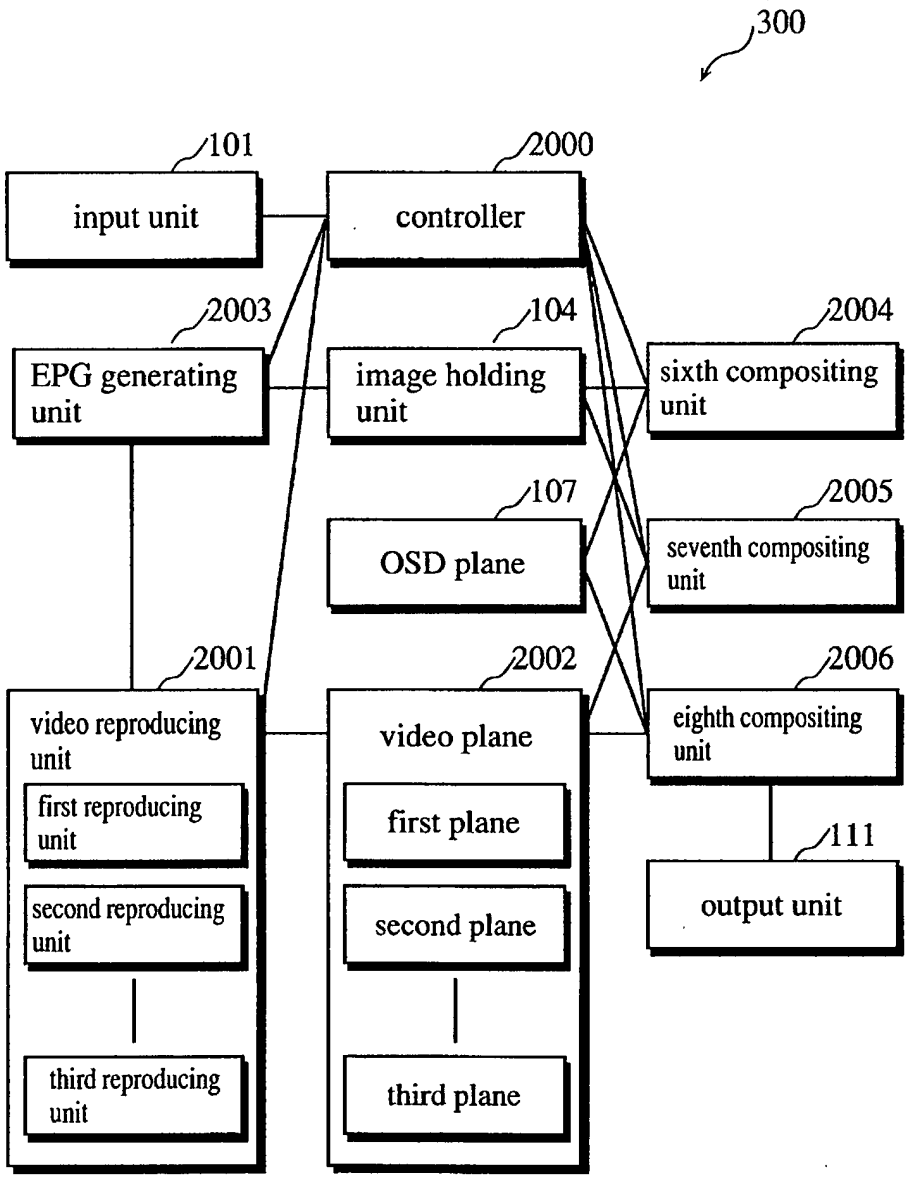

300
101
input unit
2000
controller
2003
EPG generating unit
104
image holding unit
2004
sixth compositing unit
107
OSD plane
2005
seventh compositing unit
2001
video reproducing unit
first reproducing unit
second reproducing unit
third reproducing unit
2002
video plane
first plane
second plane
third plane
2006
eighth compositing unit
111
output unit

FIG.21

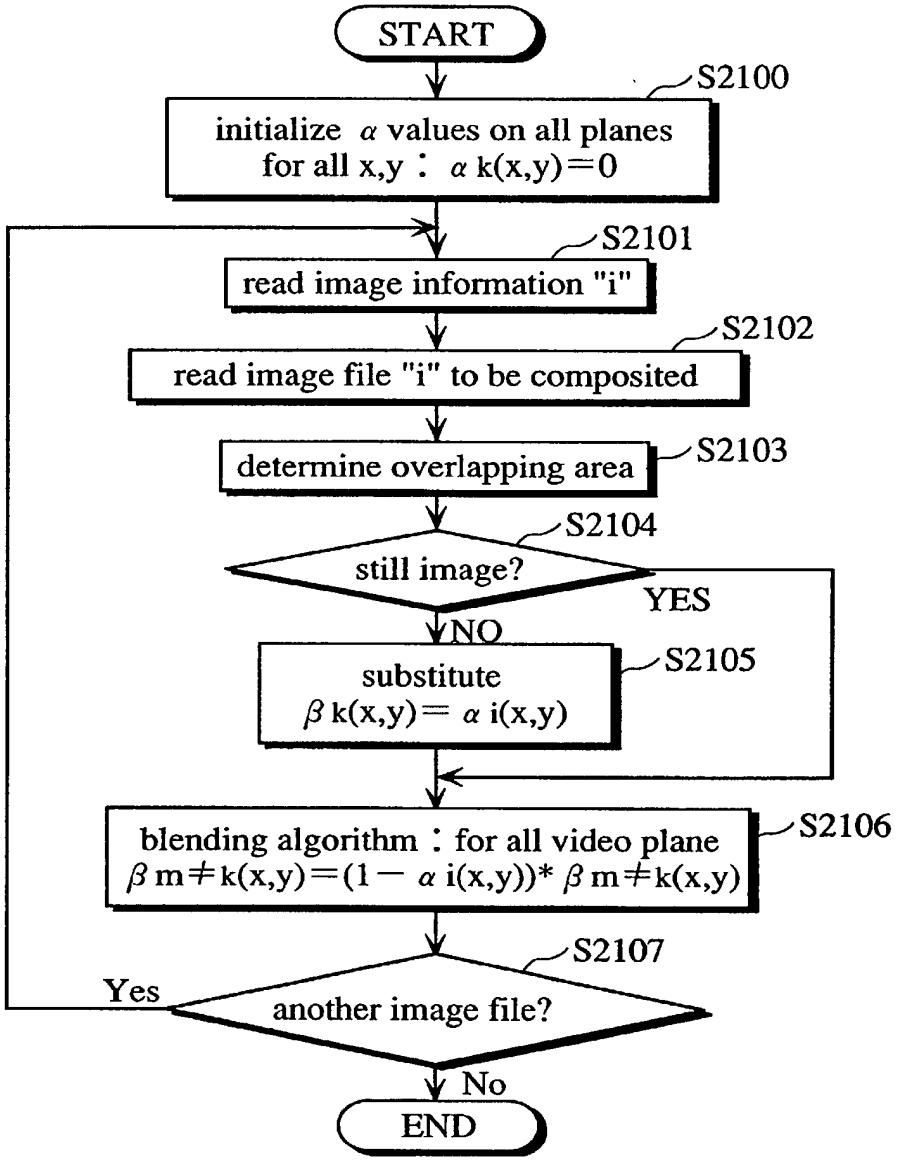

START
S2100
initialize α values on all planes
for all x,y : α k(x,y)=0
S2101
read image information "i"
S2102
read image file "i" to be composited
S2103
determine overlapping area
S2104
still image?
YES
NO
substitute
β k(x,y)= α i(x,y)
S2105
blending algorithm : for all video plane
β m≠k(x,y)=(1− α i(x,y))* β m≠k(x,y)
S2106
S2107
Yes
another image file?
No
END

FIG.22

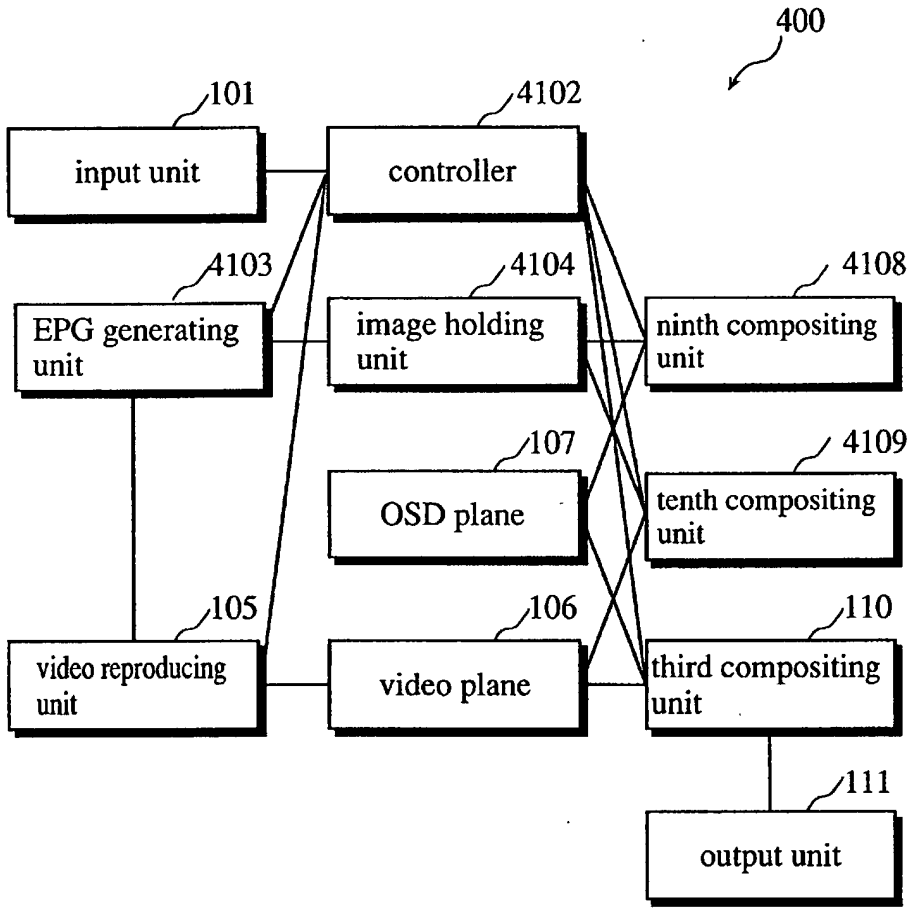

400
101
input unit
4102
controller
4103
EPG generating unit
4104
image holding unit
4108
ninth compositing unit
107
OSD plane
4109
tenth compositing unit
105
video reproducing unit
106
video plane
110
third compositing unit
111
output unit

FIG.23A

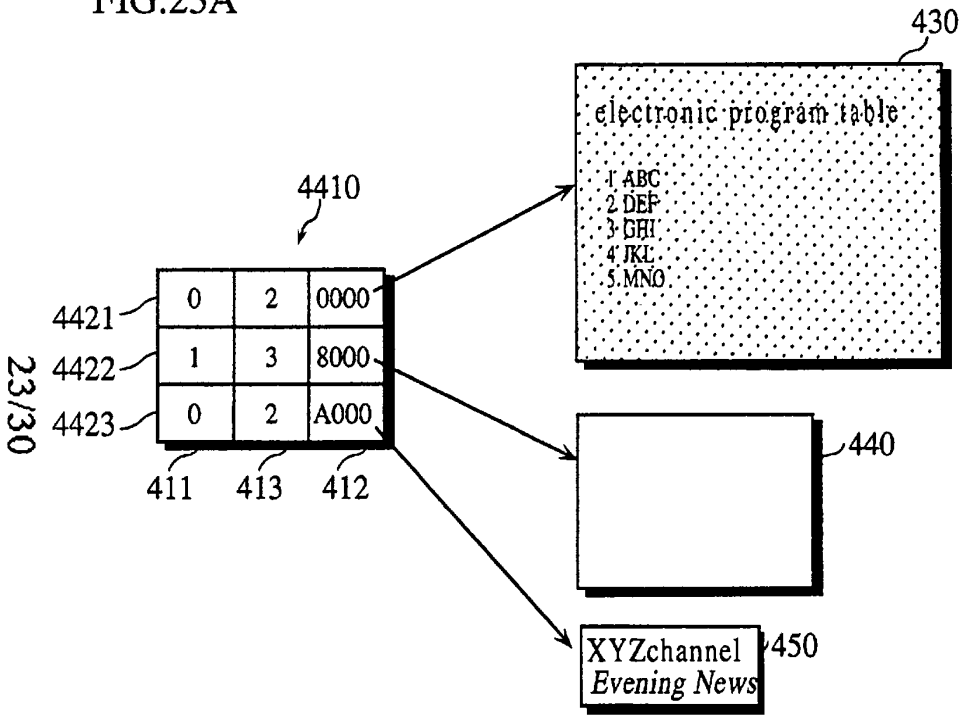


FIG.23B

number	operation type
1	CLEAR
2	SRC
3	SRC_OVER
4	DST_OVER
5	SRC_IN
6	DST_IN
7	SRC_OUT
8	DST_OUT

FIG.24

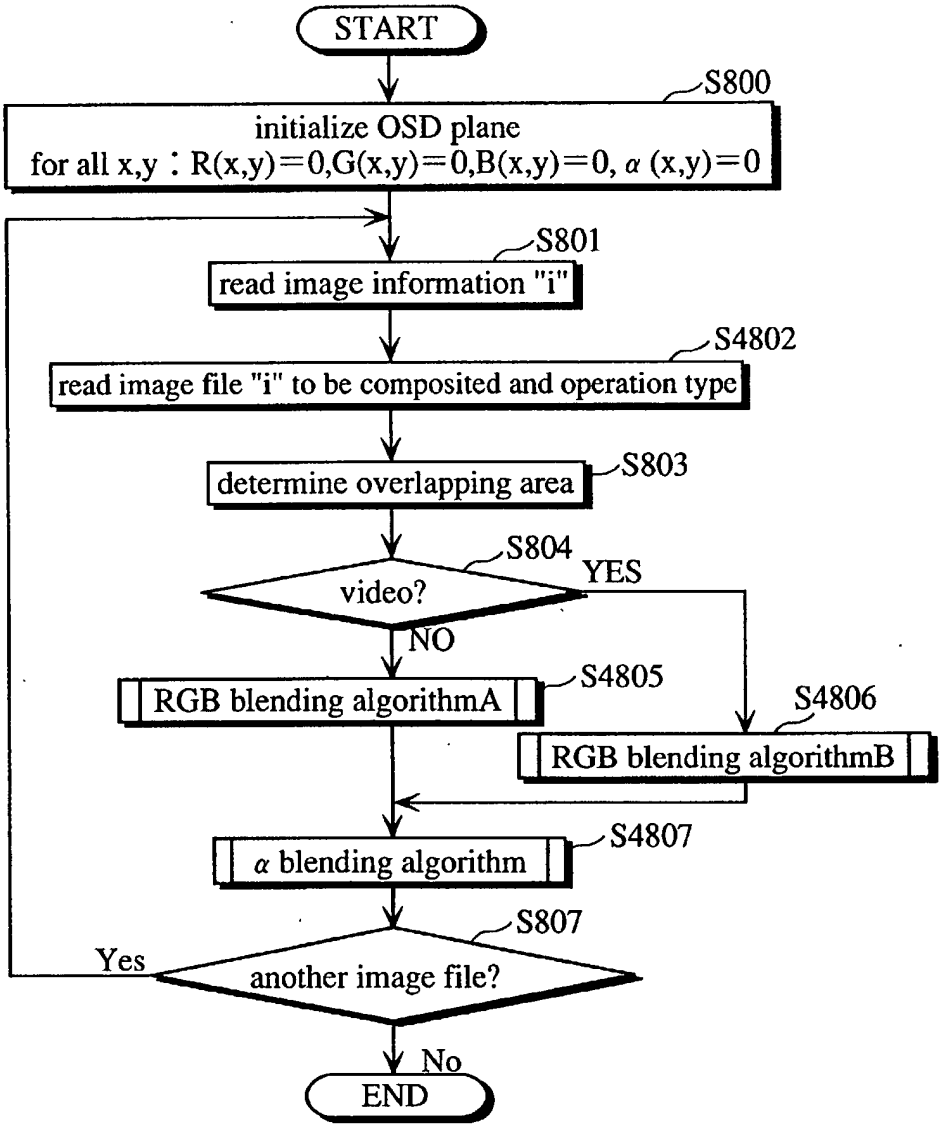

START
S800
initialize OSD plane
for all x,y : R(x,y)=0,G(x,y)=0,B(x,y)=0, α (x,y)=0
S801
read image information "i"
S4802
read image file "i" to be composited and operation type
S803
determine overlapping area
S804
video?
YES
NO
S4805
RGB blending algorithmA
S4806
RGB blending algorithmB
S4807
α blending algorithm
S807
Yes
another image file?
No
END

FIG.25

operation type	operation
CLEAR	$R=0, G=0, B=0$
SRC	$R=\alpha_i \cdot R_i, G=\alpha_i \cdot G_i, B=\alpha_i \cdot B_i$
SRC_OVER	$R=\alpha_i \cdot R_i+(1-\alpha_i) \cdot R, G=\alpha_i \cdot G_i+(1-\alpha_i) \cdot G,$ $B=\alpha_i \cdot B_i+(1-\alpha_i) \cdot B$
DST_OVER	$R=R+(1-\alpha) \cdot \alpha_i \cdot R_i, G=G+(1-\alpha) \cdot \alpha_i \cdot G_i,$ $B=B+(1-\alpha) \cdot \alpha_i \cdot B_i,$
SRC_IN	$R=\alpha \cdot \alpha_i \cdot R_i, G=\alpha \cdot \alpha_i \cdot G_i, B=\alpha \cdot \alpha_i \cdot B_i$
DST_IN	$R=\alpha_i \cdot R, G=\alpha_i \cdot G, B=\alpha_i \cdot B,$
SRC_OUT	$R=(1-\alpha) \cdot \alpha_i \cdot R_i, G=(1-\alpha) \cdot \alpha_i \cdot G_i,$ $B=(1-\alpha) \cdot \alpha_i \cdot B_i$
DST_OUT	$R=(1-\alpha_i) \cdot R, G=(1-\alpha_i) \cdot G, B=(1-\alpha_i) \cdot B$

FIG.26

operation type	operation
CLEAR	R=0, G=0, B=0
SRC	R=0, G=0, B=0
SRC_OVER	R=(1− α_i) · R, G=(1− α_i) · G, B=(1− α_i) · B
DST_OVER	R=R, G=G, B=B
SRC_IN	R=0, G=0, B=0
DST_IN	R= α_i · R, G= α_i · G, B= α_i · B
SRC_OUT	R=0, G=0, B=0
DST_OUT	R=(1− α_i) · R, G=(1− α_i) · G, B=(1− α_i) · B

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FIG.27

operation type	operation
CLEAR	$\alpha = 0$
SRC	$\alpha = \alpha_i$
SRC_OVER	$\alpha = \alpha_i + (1 - \alpha_i) \cdot \alpha$
DST_OVER	$\alpha = \alpha + (1 - \alpha) \cdot \alpha_i$
SRC_IN	$\alpha = \alpha \cdot \alpha_i$
DST_IN	$\alpha = \alpha \cdot \alpha_i$
SRC_OUT	$\alpha = (1 - \alpha) \cdot \alpha_i$
DST_OUT	$\alpha = (1 - \alpha_i) \cdot \alpha$

FIG.28

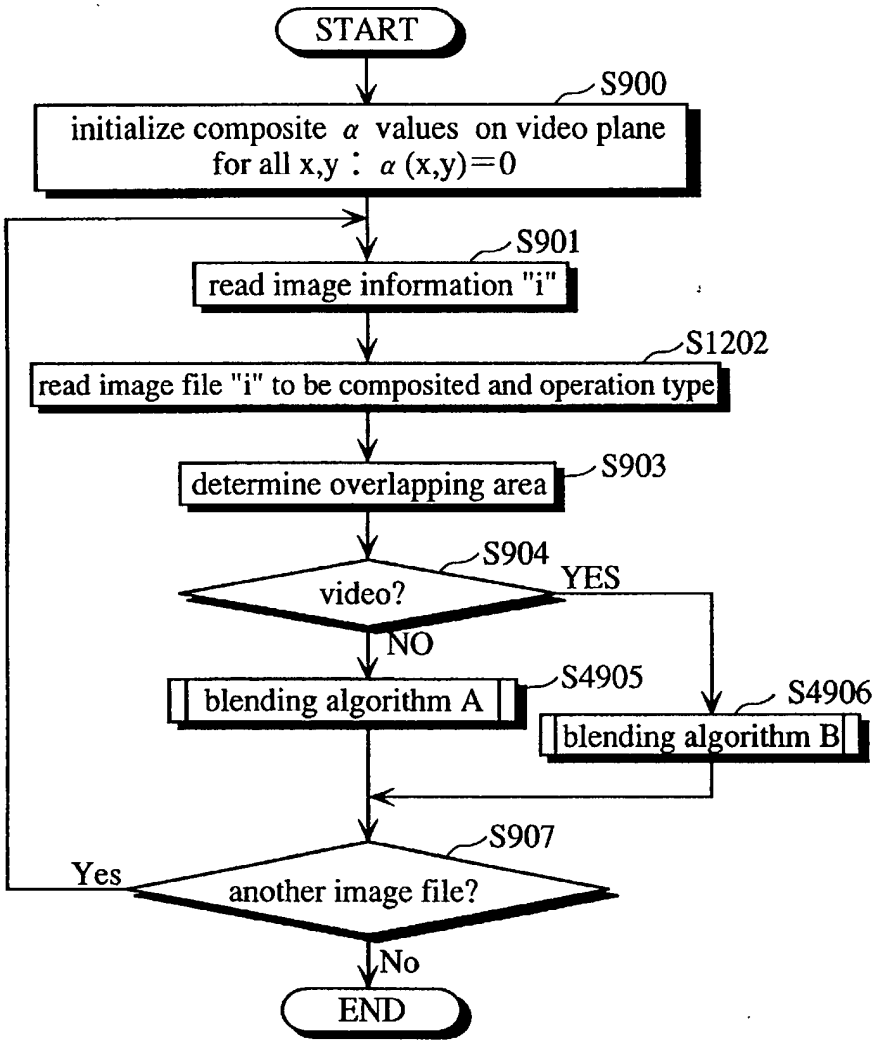
START
S900
initialize composite α values on video plane
for all x,y : α (x,y)=0
S901
read image information "i"
S1202
read image file "i" to be composited and operation type
S903
determine overlapping area
S904
video?
YES
NO
S4905
blending algorithm A
S4906
blending algorithm B
S907
Yes
another image file?
No
END

FIG.29

operation type	operation
CLEAR	$\alpha = 0$
SRC	$\alpha = 0$
SRC_OVER	$\alpha = \alpha \cdot (1 - \alpha_i)$
DST_OVER	$\alpha = \alpha$
SRC_IN	$\alpha = 0$
DST_IN	$\alpha = \alpha \cdot \alpha_i$
SRC_OUT	$\alpha = 0$
DST_OUT	$\alpha = (1 - \alpha_i) \cdot \alpha$

FIG.30

operation type	operation
CLEAR	$\alpha = 0$
SRC	$\alpha = \alpha_i$
SRC_OVER	$\alpha = \alpha_i$
DST_OVER	$\alpha = \alpha_i \cdot (1 - \alpha_{osd})$
SRC_IN	$\alpha = \alpha_i \cdot \alpha_{osd}$
DST_IN	$\alpha = 0$
SRC_OUT	$\alpha = (1 - \alpha_{osd}) \cdot \alpha_i$
DST_OUT	$\alpha = 0$

FIG.31

```
1     R=0 ;
2     G=0 ;
3     B=0 ;
4     α =0 ;
5     α v=0 ;
6     for (i=0 ; i<=N ; i++) {
7       if (VIDEO=component i) {
8               R,G,B update A
9               α v update A
10      } else {
11              R,G,Bupdate B
12              α v update B
13      }
14      α update
15    }
16    R=R+ α v*Rv ;
17    G=G+ α v*Gv ;
18    B=B+ α v*Bv ;
```